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Abstract

This paper investigates second generation immigrant's early labour-market performances in Sweden. To study their labour-market success we estimate dynamic transition rate models -Cox type proportional hazards, in a competing risk framework using register based panel-data set. Our results reveal that parental resources affect not only second-generation immigrants' continuing education but also their later labour-market success. The study verifies that finding a job is difficult for second-generation immigrants and the significant unobserved-heterogeneity parameter estimate may indicate discrimination. As a whole, second-generation immigrants have worse labour-market performances compared to their native-born counterparts.

Keywords: Second-generation immigrants, labour-market experiences, duration-models, competing-risks, unobserved heterogeneity.

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1 Introduction

The purpose of this paper is to analyse the early labour-market experiences of second-generation immigrants in Sweden. One might think that "second-generation" immigrants, born in the country new to immigrant parents, would be better off than their parents in terms of economic and social integration since they go to school in the new country, and thus have better opportunities to learn the language, make friends with the native population, and develop country-specific human capital. But what about the empirical facts? What kind of early labour-market experiences have second-generation immigrants had after finishing compulsory education? This paper attempts to find answers to these questions.

Although there is a vast literature about first generation immigrant's economic integration, there are few studies about second-generation immigrants, either in the United States (Chiswick, 1977; Carliner, 1980; Borjas, 1992, 1993, 1994; Card *et al.*, 1998) or in Europe (Gang and Zimmerman, 2000; Nielsen *et al.*, 2001; Riphahn, 2001; Van Ours and Veeneman, 2001, 2002; Ekberg and Rooth, 2002). A problem common to these studies is the type of data used: most of these studies are based on cross-sectional data sets. In general, cross-section studies do not permit to making strong causal interpretations. On the contrary, Lam (1996)

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found, for instance, that the cross-sectional estimates of the growth in earnings of immigrants in the United States were underestimated for these groups of immigrants when the results of cross-sectional estimates were compared with the results of longitudinal data.

In this paper, we aim to improve the analysis of second-generation immigrants' economic integration in three aspects: data set, models and results. The contribution of this paper is therefore threefold. The first contribution is methodological and related to the data set we use. Longitudinal research has certain advantages, such as measuring change and establishing temporal order, but there are offsetting difficulties since it requires more advanced techniques. The data set, which we use in this study is a longitudinal one for the period 1991-2000. The annual observations are based on a Swedish register data set called Longitudinal Individual Data (LINDA) and it is rich with the socioeconomic variables. We draw a statistical twin sample for native-borns, which is also randomly chosen and helps us to make reliable comparisons. It is different from other data sets that are used in the analysis of second-generation studies in many aspects. The early experiences of new entrants into the labour-market may help determine developments later in their life. Those who are 16-25 years old may encounter many important changes, such as completing their education, getting their first job, building a family and becoming a parent. All of these factors will affect their later labour-market behaviour and success, such as time spent in employment,

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and returns from human-capital investment such as wages. Besides, the heterogenous feature of the second-generation immigrants are taken into account by grouping them into similar geographical units. The second-generation immigrants are all from the same age cohorts. They are 16/17 in 1991 and 25/26 in 2000. This prevents us from average age differences across ethnic groups which can affect the results.

The second contribution of this paper is also methodological and related to the models we estimate, which are dynamic and control unobserved heterogeneity. We estimate four different types of transitions models into the labour-market: The first two are from compulsory and post-compulsory education to various competing states; the last two are from non-employment to work after compulsory or post-compulsory education. The first transition is modelled by fitting a multinomial-logit model since the waiting-time after compulsory education is the same for all individuals and there is no time-dependency. The transition from post-compulsory education to work, non-employment or the military is modelled in a competing-risks hazard-framework by using semi-parametric Cox and parametric duration-dependence distributions. We also look to the transitions to work after non-employment after compulsory and post-compulsory education. Based on the results of an information-matrix test, we fit hazard-models to both of the transitions —transition from post-compulsory education to various states and transition from non-employment after post compulsory education to work— taking into ac-

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count inter-individual heterogeneity.

The third contribution of this paper is a substantive one and related to the evidences we find for the debate of immigrant's economic integration, which do not support a quick economic integration of immigrants, the so called "melting pot" hypothesis. Our results reveal that parental resources affect not only the second-generation immigrants' continuing education but also their later labour-market success. For all young people, regardless of their ethnic background, parental capital in the form of educational attainment, occupation and income are vital. Ethnic capital and neighbouring characteristics such as other intergenerational transmission-channels are also important. The study verifies that finding a job is difficult for second-generation immigrants, especially for those coming from Africa, Latin America and Middle East. The significance of an unobserved-heterogeneity parameter may indicate discrimination. As a whole, second-generation immigrants have worse labour-market performances than their first-generation counterparts and weaker chances for an economic catch-up and thus slow economic integration with persistent earning-differantials from their native-born counterparts. The conclusions drawn using such dynamic models, estimated using the Swedish panel data set are giving much more convincing support to Borjas' North-American results of a long integration process of immigrants, and imply some necessary changes in the current economic policies for second-generation immigrants.

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The evidences found in this study therefore raise some policy implications. First, an increase in the economic income status and an improvement of the labour market attachment of the low-income families will also lead to a progress in their children's entry into labour market. We therefore suggest policies to achieve a more equal income distribution in the society in the long run.

Second, the low probabilities of finding a job for second-generation immigrants, especially for those coming from Africa, Latin America and Middle East require some origin country-specific arrangements. We thus recommend policies, such as giving specific information to these groups or arranging special campaigns for them in the short run.

Third, discrimination of immigrants in the labour market makes necessary some anti-discrimination measures in the society, in general.

Next section reviews previous research about second-generation immigrants. Section 3 presents the theoretical issues while Section 4 describes the data and discusses sample-selection issues. Section 5 analyses the modelling issues. Section 6 presents the results and finally the last section offers a conclusion.

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2 Previous research about second-generation immigrants

2.1 Studies in the United States

Europe and the United States, and especially Sweden and United States, differ in many respects, including differences in social policies and provisions of the welfare state. An important goal of Swedish immigrant policy has been to assure equal opportunities of immigrants, who should have the same employment and income earnings, although this has not always worked out in practice. Even post-compulsory education is tuition-free for all in Sweden and there is a fairly generous transfer system, including low-cost medical care. Nevertheless, both US studies and those from other European countries may be relevant to Swedish experience. Using US census-data to analyse contemporary immigrant-flows, Chiswick (1977), Carliner (1980) and Borjas (1992, 1993 and 1994) come to different conclusions about the experience of the sons of immigrants in the US labour market. Using data from the 1/1000 sample of the 1970 Census of Population, Chiswick found that sons of immigrants had a 5 percent earnings-advantage over native-born white male Americans. Both Chiswick and Carliner concluded that characteristics associated with positive selection in the immigrant-population had been transmitted to their children. Analyzing the inter-generational mobility experienced by immigrants in the context of economic model of immigration, Borjas (1993)

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questioned Chiswick's and Carliner's results, since their studies were based on cross-sectional data. Borjas examined the earnings of immigrants and second-generation immigrants across decennial censuses from 1940 to 1970. Assuming that first-generation immigrants in the 1940 census were the parents of second-generation immigrants in the 1970 census, he found that, although there was some regression toward the mean, the average earnings of the second-generation of any given ethnic group were strongly influenced by the earnings of the corresponding first-generation group. He postulated that the immigrant characteristics in the source countries which determine migrant-selection had introduced differentials in skills between ethnic groups which resulted in persistent earnings-differentials. Field-Hendrey and Balkan (1991) investigated the earnings and assimilation of female immigrants to the US, using 1970 and 1980 data. They found that, taken as a group, female immigrants with similar characteristics to natives had initially lower earnings but did catch up within about ten years. Later on, Card, DiNardo and Estes (1998) found that, despite the fact that an increasing fraction of today's second-generation immigrants were the grandchildren of the formerly lowest-paid immigrant groups, they now tended to have higher wages than long-time natives.

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2.2 Studies in Europe

2.2.1 Educational attainment

In Europe, most of the research about second-generation immigrants has been done in Germany, the Netherlands, Denmark, and Sweden. Since understanding the economic integration of ethnic communities requires understanding of the human capital process, educational attainment has been one of the main research topics.

Gang and Zimmerman (2000), using information for 1984 from the German Socioeconomic Panel, explored three aspects of educational attainment: total years of education, schooling-level, and vocational training. Their sample consisted of 4678 individuals, 17-38 years old, 3895 of whom were Germans while 783 were second-generation immigrants. They found that parents' education had no effect on the educational attainment of their children, but that ethnicity mattered. They concluded that the effects of the parents' education had been completely depreciated, and that the inter-generational transfer of human capital disappeared with the shock of immigration.

Riphahn (2001), using five pooled microcensuses (a one percent random sample of the population) from 1989, 1991, 1993, 1995 and 1996, estimated completed degrees and school-attendance of second-generation immigrants in Germany. The sample consisted of 55,570 natives and 3,627 second-generation immigrants. By focusing on the development over time using an ordered-probit model, she found that second-generation

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immigrants did not assimilate to the native education-level and that the attainment-lag did not diminish over time. She interpreted this by pointing to the changing country of origin of second-generation immigrants.

Van Ours and Veeneman (2001) explored the extent to which differences in educational attainment between second-generation immigrants and natives exist in the Netherlands. Using a 1998 nationwide survey where the second-generation immigrants consisted of Turks, Moroccans, Surinamese, and Antilleans, they analysed the probabilities of continuing education and of the level of education attained, with binary-probit and ordered-probit models, respectively. Their main conclusion was that, controlling for parental education-level, differences between second-generation immigrants and natives largely vanished.

Nielsen et.al. (2001), using Danish panel-data originating from administrative registers covering the period 1985-1997, focused on the probability of obtaining a "qualifying education", defined as education lasting at least 18 months beyond the compulsory level. Their results indicated that, for males the number of years since the parents immigrated to Denmark had a statistically significant positive effect, whereas for females the parents' income was an important factor affecting them positively. The education of parents was found to be statistically significant only for ethnic Danes, while having parents with several years of labour-market experience had a statistically significantly positive effect for all groups.

Until the early 1970s, immigration to Sweden was mostly labour-force

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migration from other European countries. But since then, political upheavals elsewhere and immigration policy have caused the character of immigration to change. The number of refugees and tied movers has increased, regardless of the state of the labour market. Parallel with deterioration in the labour-market during the 1970s, unemployment increased in Sweden among immigrants. During the 1980s the employment-intensity among immigrants continued to fall, despite improvements in the labour-market from the mid-1980s onwards, see Ohlsson (1975), Ekberg and Gustafsson, (1995). Immigration reached its highest levels during the extreme boom of the late 1980s, but with the recession at the beginning of the 1990s, unemployment among immigrants increased further. Nevertheless, immigrants have stayed in Sweden, built families, and raised children conventionally called "second-generation immigrants". Österberg (2000), using the Swedish Income Panel, where 98 percent of the second-generation immigrants had European background, analysed level of educational attainment using an ordered probit model. She found that the parents' education had a positive effect on the child's educational level which decreased the negative effect from belonging to certain ethnic groups.

2.2.2 Early labour-market experiences

Van Ours and Veeneman (2002) using the same Netherlands data as before, investigated the early-labour market experiences of second-generation immigrants. Using a simple probit-model to model the probability that

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individuals had a job while still at school, they found that it was an age-related phenomenon, rather than depending on the level of education or on "neighborhood" characteristics. They also focused on the probability of having a job conditional on being out of school. The results of their bivariate-probit model pointed to the importance of the level of education for females in finding a job. For both males and females, Turkish and Moroccans had greater difficulty in finding a job. Again using a bivariate-probit model, they found that the probability of having a steady job increased with work experience, while for males education mattered. Turkish and Surinamese females were less likely to hold a steady job. Regarding the amount of hourly wages, taking possible selectivity into account, they found that education had a statistically significant effect for males, while ethnicity did not matter.

Nielsen et.al. (2001), focused on three aspects of the early-labour market experiences of second-generation immigrants in Denmark: time from leaving school until the first ordinary job; duration of the first unemployment spell; and hourly wages. In terms of data-structure and estimation-methods, this study was the closest to our work in this paper. Using a proportional-hazards model with a piecewise constant baseline-hazard for the waiting time, they found that parental capital had strong effects on entry into the labour market for females, whereas ethnic capital and "neighborhood" variables were also important for males. The education of parents had a negative effect, which they interpreted as a

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perverse effect on the probability of taking a first job.

Büchel and Frick (2003) use a panel data from the European Community Household Panel and study and expect that a successful and integrative immigration policy should result in a non-significant differential between the economics performance of immigrants and that of the indigenous population. Their results show, however, that this "ideal" is not attained in all of the analysed countries, particularly in Germany and Denmark, where the economic performance of immigrants measured in terms of the country-specific pre-government position and change in relative income position is much lower than that of the indigenous population.

Ekberg (1997), conducted the first study about second-generation immigrants in Sweden. His descriptive analyses, based on 1994 labour-market data from Statistics Sweden, showed that most were born before 1970, of European origin, had integrated well into the labour-market with hardly any difference between them and the native Swedes. The situation was completely different for those born after 1970, for whom there were also differences between ethnic groups. Månsson and Ekberg (2000), found a similar result.

Using Swedish survey data from 1988, Schröder and Wilhelmsson (1998) analysed labour-market position of second-generation immigrants seven years after graduation, where labour market position was categorized as; working; unemployed; studying; out of labour force; or other.

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Estimation results based on a multinomial-logit model indicated that second-generation immigrants, especially those coming from Asia, Africa, or Latin America, had a disadvantage in the labour-market. Second-generation immigrants who migrated after compulsory school age had a higher probability of being unemployed compared to those who immigrated earlier or were born in Sweden, and the differences persisted even other variables such as language proficiency and other Sweden-specific human capital were controlled.

Ekberg and Rooth (2002), divided 1998 data from National Labour Market Board (AMS) and Statistics Sweden into two subsets and focused on the probability of being unemployed for 25-40 year-old individuals who were part of the labour-force, according their earning levels. Probit-regression for the first outcome (unemployment) and OLS for the second, indicated that the outcomes differed greatly between different groups of second- generation immigrants, and in comparison to native born Swedes. The pattern was similar to that in the parent generation. The outcome was more favorable if one parent was born in Sweden.

Second-generation immigrants had not only higher probabilities of being unemployed compared to those who immigrated earlier or were born in Sweden, but also had higher risks of being hospitalised for mental disorders. Leão et.al. (2005) studied this incidence for second-generation immigrants in Sweden and found that second-generation adult immigrants had a higher risk of being hospitalised for mental disorders than

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the Swedish majority population after adjustment for socio-economic status. This risk was also higher for second-generation refugees than for the Swedish majority population but only for psychotic disorders.

3 Determinants of early labour-market experiences and related hypotheses

It is not clear what hypotheses to use for the early labour-market experiences of second-generation immigrants. Early works point to the inter-generational transmission process, whereby the weak labour-market position of first-generation immigrants would be transmitted to their children through various channels: parental capital, or direct effects from the parents; ethnic capital; and neighborhood effects. This was also the main point of Coleman (1988) where he asserted that both social capital in the family and social capital in the community play roles in the creation of human capital in the rising generation.

However, one has to be careful in defining these entities. For example, family background also includes financial capital and human capital, approximately measured by the parents' education which contributes to the cognitive environment of the child. Family social capital is different from either of these. Family human capital may be irrelevant if it is not complemented by social capital embodied in family relations, which in turn can depend on the number of parents present, the number of siblings

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in the family, parental time devoted to the children, etc.

In immigration literature, the seminal work on the second-generation immigrants was carried out by Borjas (1992, 1993 and 1994). Borjas (1995) extended the notion of social capital to include ethnic capital and its interaction with neighbourhood effects. Ethnic capital may include linguistic skills and external effects from the average human capital of the ethnic group, as a whole while neighbourhood effects include the negative impact on youths growing up in poor neighbourhoods. According to Borjas, residential segregation and ethnic external effects may be linked since ethnic capital includes the socioeconomic background of the neighborhood.

In our data parental characteristics are rich allowing us to disaggregate the sources of family income, such as father's labour-income, mother's labour-income, family asset-income and family welfare-income. Such an approach, used also by Hill and Duncan (1987), enabled us to test various human capital hypotheses such as the role-model hypothesis and the welfare-dependency hypothesis, which have implications for the success and social integration of the child. To test neighbourhood effect, we constructed a variable called "ethnic concentration", see Nielsen *et.al.* (2001) and Cardak and McDonald (2004), which is the percentage of first-generation immigrants in the municipality.

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4 The data and sample-selection

The data-set used in this study is the 1991-2000 panel of the register-based Longitudinal Individual Data-set (LINDA), a database of about 300,000 individuals and their household members. The core of the data is the annually-available Income Registers and Population Censuses. The database contains individuals' socioeconomic characteristics such as education related variables and labour market related variables, such as employment-status, labour-income, etc. Family members are only included in the sample as long as they stayed in the family.

Our sample, following Kossoudji, (1989), consisted of second-generation immigrants who were either born in Sweden, or immigrated before six years of age and who were 16-17 year old in 1991. We included children who migrated before the age of six, since they started school with native Swedes and had the opportunity to thoroughly learn the language of the migrated country at a very early period of their life cycle. In other words, they have access to the migration country's specific human capital. In 1991, there were 1106 second-generation immigrants and these individuals can be traced until they reach age 25-26 in 2000. The geographical origin of second-generation immigrants was determined from the father's country of birth (or if only the mother was foreign-born, it was determined from hers). A control-group of 1106 same-age native Swedes (16-17 years old in 1991, born in Sweden with both Swedish parents) was matched by county of residence were also traced until they

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reach age 25-26 by 2000.

We have analysed four sets of labour-market experiences. The first was the transition from compulsory school to various states: continuing their education, finding a job, or non-employment. Among the 2212 individuals in both groups, 1941 continued their education while 162 found a job and 109 were non-employed during the first year after compulsory education. None of the 109 individuals returned to school during the following 10 years of the study period while the overwhelming majority of the 162 individuals who found a job continued to work. Next we analysed the transition from continuing education to work, non-employment, or the military. Of the 1941 native Swedes and second-generation immigrants who initially continued their education, 637 transited to work, 657 to non employment, while some 262 went to military and the rest continued in school. Finally we looked at transitions from non-employment to work or the military, either after compulsory education or after continuing education.

A list of the variables and their sample characteristics are given in Table 1. Just over a half of the 1106 second-generation immigrants were males, compared with just under a half of the native Swedes. About only a third of the second-generation immigrants had been born outside Sweden. Three quarters lived in two-parent families, essentially the same as native Swedes. The number of siblings was slightly higher for the immigrants. The average age of the "head of household" (the father if

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two parents were present) was almost the same for second-generation immigrants and for native Swedes (about 46).

[Table 1 about here]

We classified parent's education according to the highest level attained by at least one parent: compulsory level; high-school level; or university degree. Considerably more immigrant parents had completed ninth grade only (27.7 percent) than native Swedish parents (15.5 percent). On the other hand, considerably more native Swedish parents (37.1 percent) than immigrant parents (28.8 percent) had a college or university degree. The percentages who had completed high-school were more similar though slightly higher for native Swedes.

Nearly half of the second-generation immigrants were of Nordic origin, most of them Finnish. The rest can be classified in six groups coming from industrialized western countries, including USA, Australia, Canada and the EU; Eastern Europe; Middle-East; Asia; Africa; and Latin America.

The ethnic concentration, was only slightly higher for second-generation immigrants than for native Swedes.

Native Swedes had only slightly more total parental income than did second generation immigrants. Father's labour income, mother's labour income, and asset income were all substantially higher for native Swedes, whereas parents' welfare income was somewhat higher for the immigrants,

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though not enough to make up the difference.

5 Statistical modelling

Transiting from compulsory education to various states is analyzed using multinomial logit regression —since there was no time-dependency— the later transitions from continuing education or from initial non-employment after compulsory-education to various states are modeled in a competing-risks framework, and transition from non-employment after post-compulsory education to work is modeled in a single-destination framework. This means not only that we analyzed the duration of the non-occurrence of the event of interest —except transitions from compulsory education— but we also distinguished between different types of transitions. We assumed a priori that the occurrence of each type of transition had a different causal structure. The same covariates might be relevant but each transition could have an independent set of parameters, see Kalbfleisch and Prentice (1980 and 2002).

When time T is continuous and measured precisely so that there are no ties, such continuous time survival procedure could be adopted: let x be a vector of covariates. In a competing-risks framework, a cause-specific or type-specific model can be represented by

$$h_j(t;\mathbf{x}) = \lim_{dt\to 0} dt^{-1} P(t \le T < t+dt, \quad J = j \mid T \ge t, \ \mathbf{x}) \qquad (1)$$

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where $j = 1, ..., m$ and $t > 0$; $h_j(t; \mathbf{x})$ denotes the instantaneous risk of experiencing a transition of type j in the time interval $(t \leq T < t + dt)$ given that no transition occurred before $T = t$. The overall hazard-rate can be obtained by summing the transition specific hazard rates, that is,

$$h(t;\ \mathbf{x}) = \sum_{j=1}^{m} h_j(t;\ \mathbf{x}) \tag{2}$$

The overall survivor function is

$$S(t;\ \mathbf{x}) = P(T > t \mid \mathbf{x}) = \exp\left(- \int_0^t h(u;\ \mathbf{x})\ du \right)$$

if we substitute in the transition specific hazard rates then we obtain

$$\begin{aligned} S(t;\ \mathbf{x}) &= \exp\left(- \int_0^t \sum_{j=1}^{m} h_j(u;\ \mathbf{x})\ du \right) \\ &= \prod_{j=1}^{m} \exp\left(- \int_0^t h_j(u;\ \mathbf{x})\ du \right) \end{aligned} \tag{3}$$

The density-function for the time until a type j transition is then

$$\begin{aligned} f_j(t; \mathbf{x}) &= \lim_{dt \to 0} dt^{-1} P(t \leq T < t + dt,\ J = j \mid \mathbf{x}) \\ &= h_j(t;\ \mathbf{x})\ S(t;\ \mathbf{x}) \end{aligned} \tag{4}$$

It must be noted, however, that $f_j(t;\ \mathbf{x})$ is not the density-function of the duration-time. In particular

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$$\int_0^\infty f_j(t;\ \mathbf{x})\ dt = P(J = j \mid \mathbf{x}) = \boldsymbol{\pi}_j(\mathbf{x}) \tag{5}$$

where $\boldsymbol{\pi}_j(\mathbf{x})$ is the probability of transition into the jth state $j = 1, ..., m$, given the covariate-vector $\mathbf{x}$, with the relationship

$$\sum_{j=1}^{m} \boldsymbol{\pi}_j(\mathbf{x}) = 1 \tag{6}$$

If $t_{j1} < t_{j2} < ... < t_{jn_j}$ represents the n_j uncensored durations until the transition j, then the likelihood-function may be rewritten as

$$L = \prod_{j=1}^{m} \prod_{k=1}^{n_j} h_j(t_{jk};\ \mathbf{x}_{jk}) \prod_{i=1}^{n} S_j(t_i; \mathbf{x}_i) \tag{7}$$

where $\mathbf{x}_{jk}$ is the covariate of an individual with the observed non-censored duration t_{jk} and

$$S_j(t_i;\ \mathbf{x}_i) = \exp\left(- \int_0^{t_i} h_j(u;\ \mathbf{x}_i)\ du \right) \tag{8}$$

The likelihood-function may be divided into the product

$$L = \prod_{j=1}^{m} L_j \qquad \text{with} \qquad L_j = \prod_{k=1}^{n_j} h_j(t_{jk};\ \mathbf{x}_{jk}) \prod_{i=1}^{n} S_j(t_i;\ \mathbf{x}_i) \tag{9}$$

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The L_j-factors may be further rearranged as

$$L_j = \prod_{i=1}^{n} [h_j(t_{jk};\ \mathbf{x}_{jk})]^{\delta_{ij}} \quad S_j(t_i;\ \mathbf{x}_i) \tag{10}$$

$$\text{with } \delta_{ij} = \begin{cases} 1 & \text{if for individual } i \text{ a transition to state } j \text{ occurs at time } t_i \\ 0 & \text{otherwise} \end{cases} . \tag{11}$$

The log-likelihood function $\ln L = \sum_{j=1}^{m} \ln L_j$ can be maximised separately for each transition type $j = 1, ..., m$, given that the transition-specific hazard rates $h_j(t \mid \mathbf{x})$ are dependent upon the parameter-vector θ_j, where the θ's have no common components. In particular, a parametric model $h_j(t;\ \mathbf{x},\ \theta_j)$ can be specified for the type-specific hazards (see, Cox and Oakes, 1984).

For the transitions from continuing education to various states, as well as later transitions from non-employment after compulsory or post-compulsory education, we first plotted the smoothed non-parametric hazard functions against time and the hazard functions displayed non-monotonic curves. The log-logistic model was ideal in catching the turning-points in these cases. We then fitted log-logistic model[1]in the competing-risks framework discussed above, since in the case fitting a proper parametric distribution function one can obtain more efficient estimates than estimates of a semi-parametric model. In addition, we also fitted Cox proportional-hazards model.[2]Since Cox's method does not require some particular probability distribution to represent survival times,

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it is considerably more robust. It can also accommodate both discrete and continuous measurements of transition times. The cause-specific hazard functions mentioned above, can be modeled by using Cox model in the following way:

$$h_j[t; \mathbf{x}_i] = h_{0j}(t) \exp[\mathbf{x}_i' \beta_j], \qquad j = 1, ..., m, \tag{12}$$

where $\mathbf{x}_i$ is a vector of covariates, h_{0j} and β_j are the baseline hazards and the regression coefficients respectively which vary arbitrarily over the m transition types. As before, let $t_{j1} < t_{j2} < ... < t_{jn_j}$ represent the n_j uncensored durations until the transition j, $j = 1, ..., m$. The corresponding partial likelihood is

$$L(\beta_1, ...\beta_m) = \prod_{j=1}^{m} \prod_{i=1}^{k_j} \frac{\exp[x_i \beta_j]}{\sum_{l \in R(t_{ji})} \exp[\mathbf{x}_i' \beta_j]} \tag{13}$$

the arbitrary baseline hazard function has been eliminated and the resulting likelihood can be used for inferences about $\beta_j' s$.

The modelling issues above rely on the implicit assumption that the exogenous variables were measured without any error and that there were not any omitted variables in the model. In other terms, there was an implicit assumption that the error term in the model had white noise characteristics. If we have any omitted variable in the model the omission of such an effect can introduce important biases on the estimates of the parameters of interest (Gourieroux, 1989). The results based on

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Information Matrix Test detected such unobserved heterogeneity in the case of transitions from continuing education to various states, as well as transition from non-employment after continuing education to work (see Appendix A). As a result, we introduced a gamma type unobserved heterogeneity term to the parametric and semi-parametric specifications mentioned above, which is the survival-data analog to regression models with random effects. Such an unobserved heterogeneity is a latent random effect that enters multiplicatively on the hazard function.

The estimated parameters of the transitions from compulsory education to various states, based on multinomial-logit model are reported in Section 6.1. The estimated parameters of the transitions from continuing education to various states, as well as transition from non-employment after continuing education to work, based on Cox proportional-hazard gamma-mixture and log-logistic hazard gamma-mixture[3]specifications are reported in Sections 6.2 and 6.4. The estimated parameters of the transitions from non-employment after compulsory education, based on Cox proportional-hazard and accelerated failure-time log-logistic specifications are reported in Section 6.3.

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6 Results

6.1 Transitions from compulsory education

After the completion of compulsory education at ages 16-17, everyone in the sample either continued their education, went to work, or transited to non-employment. Table 2 shows the estimated parameters from the multinomial-logit regression for those who transited to work, continued to higher education or transited to non-employment.

Having at least one Swedish parent made the odds of continuing education versus working 1.6 ($\approx \exp(0.496)$, looking at the first column) times higher, and the odds of continuing education versus being in a non-employed state 1.8 ($\approx \exp(0.563)$),[4] looking at the second column) times higher. The parameter of coming from a two-parent family is also statistically significant and made the odds of continuing education versus being non-employed 1.6 times higher. Both results can be interpreted in the light of Coleman's (1988) theory of social capital where he postulates that social capital in the family plays a role in the creation of human capital in the raising generation. Parent education is also a discerning factor. Having parents with university education made the odds of continuing education versus working 2.0 ($\approx \exp(0.680)$) times, and the odds of continuing education versus being non-employed 1.9 times higher than having parents with secondary education. Again, these results confirm the earlier research. It can be interpreted in the light of

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inter-generational transmission process and are in accordance with those of Österberg (2000). Geographical origin mattered in the case of Asians (continuing education versus working), Middle-Easterns and Africans[5], and East-Europeans (transiting to non-employment versus continuing to higher education). The significance of parental income is at the 10 percent significance limit but when we disaggregated the source of parental income, father's labour income and welfare income were significant but affected the odds in the opposite way. Father's labour income increased the odds of continuing education versus both working and being in non-employment state whereas welfare income decreased it.

[Table 2 about here]

6.2 Transitions after continued education

Table 3 shows the results of the estimated parameters based on Cox proportional-hazard gamma-mixture and log-logistic hazard gamma-mixture models. The results from both models are similar. The signs, as expected are the same in both models. One can see that having parents with higher education decreases the hazard of exit from continuing education to work, to non-employment and to military. This result is somewhat similar to that of Nielsen *et.al.* (2001), with Danish data, which they interpreted as a "perverse effect" on the probability of entering the first job after leaving the educational system. In our case, the original state is contin-

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uing education, which one can be viewed in the social-capital framework of the family. Highly-educated parents may motivate their children more or act as role-models.

[Table 3 about here]

Compared to the native Swedes, the hazard of transiting to work was higher for other Nordics, and for Asians, —although not statistically significant— but lower for everybody else, especially the Middle-Easterns, Africans and Latin Americans.

Father's and mother's labour-income similarly decreased the hazard of exit to work, joining the military and transiting to non-employment.

The statistical significance of the unobserved heterogeneity-parameter in the parametric case may indicate ethnic discrimination in Sweden since we controlled nearly for all the individual and socioeconomic variables. Hayfron (2001 b) also draws a similar conclusion for Norway when he obtains robust discrimination estimates to the alternative methods he uses in decomposing Norwegian men-immigrant women earnings gap.

6.3 Transitions from non-employment (after compulsory education)

After compulsory education 109 individuals were initially non-employed within a year. Majority of them (70) transited from non-employment to work, while 27 joined the military. The estimated parameters of the

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transition from non-employment, based on Cox proportional hazard and accelerated failure time log-logistic models are reported in Table 4. The signs, as expected, are opposites in both models (since one of them estimates parameters for the hazard, and the other for the waiting time. If the hazard is high, then transitions occur quickly and survival times are short). Coming from a two-parent family shortened the time in the non-employment state; the ratio of estimated hazard of transiting to work was 2 ($\approx exp(0.688)$, controlling for other covariates. The risk of exit non-employment state is lower for those from the Middle-East, Latin America or Africa. Similar results are found for England and Australia. Price (2001) found that recent white and non-white immigrant men experienced much higher levels of unemployment than earlier cohorts. For whites, this effect was transitory, whereas for non-whites unemployment rates adjusted more slowly as the duration of stay increased. In contrast to the United States and Canada, Nahid and Shamsuddin (2001) observed that the probability of receiving unemployment benefits was higher for immigrants than the native born population in Australia. The neighbourhood-effect (ethnic concentration) also prolonged the waiting time in the non-employment state. Again this result is similar to that of Nielsen, et.al. (2001). Cardak and McDonald (2004) found that ethnic concentration affected positively in high school completion and university enrolment for some immigrant groups in Australia. The neighbourhood-effect (ethnic concentration) also prolonged the waiting time in the non-

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employment state. Again this result is similar to that of Nielsen, et.al. (2001). Cardak and McDonald (2004) found that ethnic concentration affected positively in high school completion and university enrolment for some immigrant groups in Australia. Having at least one Swedish parent reduced the waiting time and increased the hazard of transiting to military.

[Table 4 about here]

One of the important variables in the study of first generation immigrants' transitions from non-employment into work is language proficiency. Although it was not measured directly for immigrants in the LINDA data set, we can assume that language proficiency was sufficient for the second-generation immigrants in Sweden. Using data from the Fourth National Survey of Ethnic Minorities, Shields and Price (2001) investigated the determinants of location-specific language capital and its impact upon the employment prospects of male and female ethnic minority immigrants in Britain and found that lack of English language fluency reduced average predicted employment probabilities by 20-25 percentage points. Contrary to expectation, Hayfron (2001 a) found that language proficiency had no significant effect on immigrants' earnings when he studied the relationship between language training, language proficiency and earnings of immigrants in Norway. A probable explanation might be that immigrants needed Norwegian language proficiency to get into jobs

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in the Norwegian labour market. Once they were in employment, their wages were not necessarily determined by their proficiency in Norwegian.

6.4 Transitions from non-employment to work (after continued education)

The estimated parameters of the transitions from non-employment after continuing education to work, based on Cox proportional-hazard gamma-mixture and Log-logistic gamma-mixture specifications are reported in Table 5.

The results are very robust for both specifications. Parents with more education again seem to have children who are more likely to transit to work faster. On the other hand, those from Africa, Middle-East or Latin America were considerably less likely to exit to work. This was also found by Schröder and Wilhelmsson (1998). The parameter of total parental income was statistically significant (subcategories of income were not) and had a positive effect the hazard of transiting to work.

[Table 5 about here]

As before in both models, the parameter of unobserved heterogeneity was significant. This could indicate to discrimination in the labour market similar to that of Hayfron (2001 b) above.

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7 Summary and conclusions

We have analysed the early labour-market experiences of second-generation immigrants in Sweden. A register based data set (LINDA) containing information on 1106 16-17 year-old second-generation immigrants and a statistical twin sample of Swedes as a control group in terms of age and region (also 1106 individuals) were followed for the period 1991-2000. Four types of labour-market outcomes were studied: Transitions after compulsory education; after continued education; and from non-employment after compulsory education and after continued education.

The alternative models used showed similar results:

- Parental resources; marital-status, education, occupation, and income, are not only affecting second-generation immigrants' continued education but also their labour-market success. For all young people, regardless of their ethnical backgrounds, parental capital in the form of parents' attained education, occupation and income is vital. Intergenerational transmission channels are thus still important, contrary to what we expected for Sweden.

- Even after controlling for numerous individual, parental, socioeconomic variables, geographical origin was a major labour-market hindrance for second-generation immigrants from Africa, Middle-East and Latin America.

- The significance of an unobserved-heterogeneity parameter may indicate discrimination.

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As a whole, second-generation immigrants have worse labour-market performances than their native-born counterparts. They have weaker chances for an economic catch-up and thus show a slow economic integration with persistent earning-differentials. Our conclusions give therefore a strong support to the Borjas' North-American results of a long integration process of immigrants.

7.1 Policy implications

The evidences found in this study therefore raise some policy implications. First, social class differences persist across generations regardless of parent's ethnical backgrounds. The children of parents who have low-income status and weak labour-market attachment have difficulties to enter successfully into labour market. An increase in the economic income status and an improvement of the labour market attachment of the low-income families will also lead to a progress of their children's entry into labour market. In this sense, there is a need for policies to achieve a more equal income distribution in the society in the long run.

Second, the low probabilities of finding a job for second-generation immigrants, especially for those coming from Africa, Latin America and Middle East require some origin country-specific arrangements, such as giving specific information to these groups or arranging special campaigns for them in the short run.

Third, political measures against discrimination of immigrants in the

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labour market in general can be improved. This situation also requires some specific policies against discrimination of immigrants together with policies against traditional prejudices of women and ethnic groups in the society, in general.

In another companion paper, Tasiran and Tezic (2006), we suggested policy changes similar to above when we studied the effects of parental income on the continuing education of second-generation Immigrants in Sweden.

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Appendix A Information matrix test and mixture models

The problem of unobserved heterogeneity, or the bias caused by not being able to include particular important explanatory variables has a

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larger impact in transition data models than in other types of regression models. Unobserved heterogeneity may introduce, among other things, downward bias in the duration effects, spurious effects of time-varying covariates, spurious time-covariate interaction effects, and dependence among competing risks and repeatable events. For transition data models testing for unobserved heterogeneity was a complex problem. A feasible approach was suggested by Lancaster (1984) and it is based in the information matrix (IM) test introduced by White (1982).

In a duration model, T be a random variable with probability density function

$$f(t \mid \theta_0,\ \theta_1), \tag{14}$$

where θ_0 is a scalar and θ_1 a vector of parameters. Let

$$g(\nu \mid \sigma^2), \tag{15}$$

be the probability density function of a random scalar variable V with mean zero and variance σ^2. Now consider the more general model for T with probability density function

$$f(t \mid \theta_0,\ \sigma^2,\ \theta_1) = \int_{\nu} f(t \mid \theta + \ \nu,\ \theta_1)\ \ g(\nu \mid \sigma^2)\ d\nu. \tag{16}$$

The parameter θ_0 that was fixed in the null model has in the generalized model with mean θ_0 and variance σ^2. To test the model we can do a score test of the null hypothesis $\sigma^2 = 0$ against the alternative hypothesis

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$\sigma^2 > 0$.

It has shown that for a large, flexible class of distributions $g(\cdot)$, and for a general choices of models $f(\cdot)$, the score function that is the basis of score test for testing the null that $\sigma^2 = 0$, is proportional to

$$\left[\frac{\partial \ln f}{\partial \theta}(t;\theta_0,\theta_1)\right]^2 + \frac{\partial^2 \ln f}{\partial \theta^2}(t;\theta_0,\theta_1). \tag{17}$$

which has expectation zero by the information matrix equality.[6]

Lancaster (1984) suggested a simple way to carry such tests. Under the null hypothesis this test statistic has a chi-squared distribution. Blossfeld, Hamarle and Mayer (1989) used a version of the same test statistic that had a normal distribution. The test statistic can be written

$$\tau = \frac{1}{2n}\sum_{i=1}^{n}\left[H^2(t_i \mid \mathbf{x}_i;\hat{\theta}) - 2\delta_i H(t_i \mid \mathbf{x}_i;\hat{\theta})\right] \tag{18}$$

where $H(t_i \mid \mathbf{x}_i;\hat{\theta})$ are the maximum likelihood estimates of the integrated hazards for the model without heterogeneity and δ_i is the censoring indicator with $\delta_i = 1$ for uncensored and $\delta_i = 0$ censored observations. We report the values of this test statistic below. The results indicate that the assumption of unobserved heterogeneity holds for these transitions.

Transition from continuing school to work: 4.49

Transition from continuing school to non-employment: 5.27

Transition from continuing school to military service: 4.50

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Transition from non-employment after continuing school to work: 2.16

ENDNOTES

[1] The log-logistic hazard function is $h(t) = \frac{\gamma\lambda(\gamma t)^{\gamma-1}}{1+(\gamma t)^{\gamma}}$ where $\lambda = \exp[-(\beta_0 + \beta_2 x_2 + ... + \beta_k x_k)]$

and the corresponding density function is

$f(t) = \frac{\lambda^{\frac{1}{\gamma}} t^{\frac{1}{\gamma-1}}}{\gamma(1+(\lambda t)^{\frac{1}{\gamma}})^2}$

[2] When there were many ties, we used the approximation method proposed by Efron (1977).

[3] The observed log-logistic hazard with gamma mixture specification becomes

$h(t) = \frac{\lambda\gamma(\lambda t)^{\gamma-1}}{1+(\lambda t)^{\gamma}}[1 + \delta \log(1 + (\lambda t)^{\gamma})]^{-1}$ where δ is the variance of the mixing gamma distribution.

[4] Between two contrasts, reversing the reference category causes reversing the sign.

[5] We put Middle-Easterns and Africans in the same category since Middle-Easterns did not transit to working state.

[6] The score function has expectation zero at the true values of the parameters.

$$E\left[\frac{\partial \ln f}{\partial \theta}(t, \theta_0)\right] = 0.$$

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It is based on the Information Matrix Equality and says that

$$I(\theta_0) = -E\left[\frac{\partial^2 \ln f}{\partial\theta\partial\theta'}(t,\theta_0)\right] = E\left[\frac{\partial \ln f}{\partial\theta}(t,\theta_0).\frac{\partial \ln f}{\partial\theta}(t,\theta_0)'\right]. \qquad (19)$$

Note that this equality only holds at the true values of parameters.

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Table1: Descriptive Statistics

	Second Generation Immigrants (n=1106)		Swedes (n=1106)		All (n=2212)	
	mean	std dev	mean	std. dev	mean	std. dev
Individual variables						
Gender						
Male	0.519	0.500	0.498	0.500	0.509	0.500
Birth place						
Born outside Sweden	0.325	0.468			0.164	0.370
Family structure						
Two-parent family	0.752	0.432	0.747	0.435	0.750	0.433
Number of Swedish parent						
At least one Swedish parent	0.426	0.495			0.713	0.452
Number of siblings	1.877	1.017	1.752	0.835	1.815	0.932
Parental variables						
Parent education						
Secondary	0.277	0.448	0.155	0.362	0.216	0.411
High school	0.436	0.496	0.474	0.500	0.455	0.498
University degree	0.288	0.453	0.371	0.483	0.329	0.470
Parent working status						
Mother working	0.769	0.423	0.816	0.387	0.792	0.406
Father working	0.858	0.352	0.932	0.256	0.895	0.306
Geographical origin						
Swedish					0.500	0.500
Nordic (not incl. Swedish)	0.498	0.500			0.249	0.432
Western Countries	0.170	0.376			0.085	0.279
Eastern-Europe	0.158	0.365			0.079	0.270
Middle-East	0.058	0.234			0.029	0.168
Asia	0.056	0.230			0.028	0.165
Africa	0.014	0.119			0.007	0.085
Latin-America	0.045	0.207			0.023	0.149
Parental Age (maximum if 2)	46.659	6.459	45.857	5.351	46.258	5.943
Ethnic concentration in municipality	0.124	0.071	0.111	0.078	0.118	0.075
Economic variables						
Parental income (log) (annual)	12.252	0.416	12.343	0.382	12.297	0.402
Father's labour income[a]	13.899	12.290	18.449	13.523	16.174	13.117
Mother's labour income[a]	9.745	7.386	11.968	7.098	10.857	7.327
Asset income[a]	0.862	4.230	1.168	3.862	1.015	4.052
Welfare income[a]	0.263	1.218	0.053	0.412	0.158	0.916
All other income[a,b]	6.574	6.132	3.962	4.566	5.268	5.560

[a] in tens of SEK

[b] Sum of all incomes other than parents' labour income,asset income and welfare income averaged over the period when the child was 15-16 (or 16-17) years old.

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Table 2:[a] **Multinomial-logit regression results for first transitions after compulsory education, with base category continuing school**

n=2212	Work (n=162)	Non Employment (n=109)
Constant[b]	4.721	-1.590
	(3.063)	(1.696)
Individual variables		
Male	-0.162	0.669^{0}
	(0.167)	(0.214)
Family structure		
Two-parent family	-0.234	-0.573^{2}
	(0.216)	(0.257)
At least one Swedish parent	-0.496^{6}	-0.563^{7}
	(0.266)	(0.317)
Parental variables		
High school education	-0.429^{3}	-0.428^{7}
	(0.199)	(0.242)
University degree	-0.680^{0}	-0.544^{7}
	(0.247)	(0.300)
Geographical Origin		
Nordic(not incl. Swedish)	0.238	0.135
	(0.258)	(0.358)
Western Countries	-0.211	0.669
	(0.368)	(0.409)
Eastern-Europe	-0.471	0.969^{1}
	(0.410)	(0.403)
Middle-East and Africa	-1.186	1.450^{0}
	(1.392)	(0.450)
Asia	-1.310^{9}	0.310
	(0.776)	(0.624)
Latin-America	-0.174	0.790
	(0.588)	(0.582)
Parental Age (maximum if 2)	-0.026^{8}	-0.004
	(0.015)	(0.017)
Ethnic Concentration in Municip.	1.936^{3}	0.491
	(0.921)	(1.385)

[a] numbers on the power of coefficients, are not powers, they indicate p-values in percents, i.e power 6 means p-value between 0.05 and 0.06...so on.

[b] The reference variables included in the constant are: female, one-parental family, no Swedish parent, secondary education, and Swedish.

* Individual variable, born outside Sweden was not significant, even in the sensitivity test, so we omitted this variable

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Table 2: (cont.) Multinomial-logit regression results for first transitions after compulsory education, with base category continuing school

n=2212	Work (n=162)	Non-employment (n=109)
Economic Variables		
Parental Income (log)	-0.429[8]	-0.329
	(0.250)	(0.297)
Father's labour income[c]	-0.210[4]	-0.229[10]
	(0.105)	(0.140)
Mother's labour income[c]	-0.129	-0.081
	(0.146)	(0.179)
Asset income[c]	-0.027	-0.164
	(0.035)	(0.121)
Welfare income[c]	0.216[0]	0.097
	(0.075)	(0.073)
All other income[c]	0.013	0.039[4]
	(0.017)	(0.019)

[c] Separate estimates are obtained when the source of parental income disaggregated using the same models and the same control variables listed above (except log Family Income). The same methodology is used in the other outcomes listed in the tables below.

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Table 3 : Estimated parameters for transitions after continued education

n=1941	to Work n=637		to Non-Employment n=657		to Military n=262	
	Cox Prop. hazard gamma mixture	Log-Logistic hazard gamma mixture	Cox Prop. hazard gamma mixture	Log-Logistic hazard gamma mixture	Cox Prop. hazard gamma mixture	Log-Logistic hazard gamma mixture
alpha Constant		-1.117		-0.561		-2.201^{1}
		(0.819)		(0.573)		(0.064)
Individual Variables						
Male[a]	-0.019	-0.028	-0.367^{0}	-0.014		
	(0.105)	(0.042)	(0.082)	(0.029)		
Born outside Sweden	-0.203	-0.064	0.242^{7}	0.066	-0.135	-0.027
	(0.190)	(0.082)	(0.133)	(0.045)	(0.254)	(0.049)
Family structure						
Two-parent family	0.261^{9}	0.101	-0.148	-0.004	-0.077	-0.033
	(0.153)	(0.062)	(0.111)	(0.038)	(0.169)	(0.039)
At least one Swedish parent[b]	0.079	0.037	0.094	-0.041		
	(0.179)	(0.073)	(0.128)	(0.044)		
Parental Variables						
High school education	-0.317^{3}	-0.106^{7}	-0.277^{1}	-0.066^{6}	-0.022	0.059
	(0.150)	(0.059)	(0.105)	(0.036)	(0.167)	(0.116)
University degree	-1.291^{0}	-0.628^{0}	-0.763^{0}	-0.218^{0}	-0.745^{0}	-0.732^{0}
	(0.168)	(0.065)	(0.123)	(0.044)	(0.203)	(0.139)
Geographical Origin						
Nordic(not incl. Swedish)	0.138	0.101	0.372^{2}	0.017	-0.018	-0.064
	(0.154)	(0.062)	(0.117)	(0.418)	(0.180)	(0.118)
Western Countries	-0.255	-0.069	0.211	-0.076	-0.823^{1}	-0.014
	(0.213)	(0.086)	(0.156)	(0.055)	(0.326)	(0.131)
East-Europe	-0.123	-0.077	0.208	-0.082	-0.486	-0.061
	(0.226)	(0.092)	(0.173)	(0.062)	(0.315)	0.123
Middle-East	-0.806^{6}	-0.834^{3}	0.832^{0}	0.027	-0.564	-0.176
	(0.484)	(0.396)	(0.231)	(0.086)	(0.559)	(0.164)
Asia	0.310	0.075	0.005	-0.098	-0.103	-0.067
	(0.355)	(0.143)	(0.269)	(0.089)	(0.427)	(0.141)
Africa	-1.046	-0.197	0.900^{2}	0.228	-0.479	-0.434^{5}
	(1.001)	(0.192)	(0.386)	(0.177)	(1.015)	(0.207)
Latin-America	-1.033^{6}	-0.357^{9}	0.597^{1}	0.223^{2}	-0.171	-0.068
	(0.549)	(0.216)	(0.253)	(0.097)	(0.512)	(0.151)

Numbers on the power of coefficients, are not powers, they indicate p-values in percents, i.e power 6 means p-value between 0.05 and 0.06...so on.

The reference variables included in the constant are: female, one-parent family, no Swedish parent, secondary education, and Swedish.

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Table 3: (cont). Estimated parameters for transitions after continued education (1941 obs)

n=1941	to Work n=637		to Non-Employment n=657		to Military n=262	
	Cox Prop. hazard gamma mixture	Log-Logistic hazard gamma mixture	Cox Prop. hazard gamma mixture	Log-Logistic hazard gamma mixture	Cox Prop. hazard gamma mixture	Log-Logistic hazard gamma mixture
Parental Age	-0.034[0]	-0.016[0]	0.002	0.018	-0.004	-0.051[8]
	(0.009)	(0.003)	(0.007)	(0.024)	(0.011)	(0.028)
Ethnic Conc.in Munic.	0.676	0.149	0.379	0.122	-0.306	0.134
	(0.566)	(0.280)	(0.537)	(0.207)	(0.864)	(0.144)
Economic Variables						
Parental Income (log)	0.145	0.006	-0.110	-0.050	-0.251	-0.064
	(0.129)	(0.066)	(0.123)	(0.045)	(0.192)	(0.051)
Father's labour income	-0.081[4]	-0.066[0]	-0.164[0]	-0.029[5]	-0.149[2]	-0.130[0]
	(0.039)	(0.022)	(0.042)	(0.015)	(0.066)	(0.042)
Mother's labour income	-0.054	-0.115[0]	-0.132[3]	-0.084[0]	-0.331[0]	-0.262[0]
	(0.059)	(0.032)	(0.060)	(0.025)	(0.101)	(0.068)
Asset income	-0.007	0.008	0.009	0.015	-0.009	-0.017
	(0.010)	(0.006)	(0.008)	(0.028)	(0.018)	(0.012)
Welfare income	-0.103	-0.059	-0.039	-0.018	-0.111	-0.078
	(0.079)	(0.039)	(0.043)	(0.017)	(0.116)	(0.072)
All other income	0.009	0.003	0.003	0.001	-0.019	-0.012
	(0.008)	(0.005)	(0.008)	(0.006)	(0.015)	(0.009)
ln_gamma constant		1.114[0]		1.883[0]		2.498[0]
		(0.052)		(0.053)		(0.067)
ln_delta constant		0.070		-1.837[0]		3.166[0]
		(0.245)		(0.066)		(0.081)
theta constant	1.260[0]		0.112		0.005	
	(0.040)		(0.405)		(0.110)	

[a,b] " male" and "at least one Swedish parent" were omitted when we focused on the transition to the military, since all who joined military were male and almost all had at least one Swedish parent.

As before, the reference variables included in the constant are: female, one-parental family, no Swedish parent, secondary education, and Swedish.

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Table 4: Estimated parameters for transitions from non-employment after compulsory education

n=109	To Work 70 obs.		To Military 27 obs.	
	Cox Proportional Hazard	Accel. Failure time Log-Logistic	Cox Proportional Hazard	Accel. Failure time Log-Logistic
Constant		-2.489		2.175
		(2.421)		(2.563)
Individual variables				
Male[a]	-0.373	0.038		
	(0.251)	(0.124)		
Born outside Sweden	0.284	-0.003	-0.425	0.221
	(0.279)	(0.124)	(0.543)	(0.176)
Family structure				
Two-parental family	0.688^{4}	-0.345^{3}	-0.122	0.053
	(0.343)	(0.165)	(0.546)	(0.187)
At least one Swedish parent	0.585	-0.302^{8}	0.555	-0.379^{5}
	(0.347)	(0.177)	(0.510)	(0.199)
Parental variables				
college education	-0.019	0.013	0.251	-0.109
	(0.287)	(0.145)	(0.454)	(0.152)
university degree	0.220	-0.062	-0.109	0.135
	(0.356)	(0.169)	(0.622)	(0.215)
Geographical Origin				
Mid-East, Africa and Latin America[b]	-2.047^{0}	0.388^{5}	-3.123^{0}	0.769^{1}
	(0.495)	(0.202)	(1.075)	(0.302)
Parental Age	-0.023^{10}	0.017^{8}	-0.017	0.004
	(0.020)	(0.010)	(0.031)	(0.011)
Ethnic Concentration in Municip.	-0.442	0.855^{0}	-0.108	0.391
	(0.347)	(0.193)	(0.430)	(0.257)

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Table 4: (cont.) Estimated parameters for transitions from non-employment after compulsory education

	to work 70 obs.		to military 27 obs.	
	Cox Proportional Hazard	Accel. Failure time Log-Logistic	Cox Proportional Hazard	Accel. Failure time Log-Logistic
Economic Variables				
Parental Income (log)	-0.057	0.194	0.180	-0.091
	(0.376)	0.186	(0.609)	0.200
Father's labour income	-0.003	0.072	0.117	-0.025
	(0.136)	(0.078)	(0.206)	(0.073)
Mother's labour income	0.072	0.043	-0.086	0.064
	(0.221)	(0.100)	(0.310)	(0.118)
Asset income	-0.164	0.052	-0.189	0.036
	(0.155)	(0.063)	(0.205)	(0.072)
Welfare income	0.084	-0.023	-0.554	0.126
	(0.075)	(0.036)	(0.426)	(0.119)
All other income	-0.014	0.017	0.024	-0.101
	(0.022)	(0.011)	(0.033)	(0.266)
scale		0.334		0.271
		(0.033)		(0.040)

[a] As in the previous outcome, Individual variable being male is omitted when we focused on the transition to military, since all of the individuals who made transition to military were male.

[b] Due to the small number of observations, those from the Middle-East, Africa, and Latin America were combined as one group with all othere as the reference group. As before, The reference variables included in the constant are: female, one-parental family, no Swedish parent, and secondary education.

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Table 5: Estimated parameters for transitions from non-employment after continued education

n=657	To Work	
	n=486 Cox Proportional hazard gamma mixture	n=486 Log-Logistic hazard gamma mixture
Constant		-3.203[1]
		(1.293)
Individual Variables		
Duration of higher education	0.011	0.002
	(0.048)	(0.024)
Male	0.116	0.080
	(0.132)	(0.064)
Number of siblings	-0.191	-0.094
	(0.079)	(0.035)
Birth place		
Born outside Sweden	0.169	0.084
	(0.200)	(0.092)
Family structure		
Two-parent family	0.304[8]	0.024
	(0.174)	(0.082)
At least one Swedish parent	-0.017	-0.113
	(0.194)	(0.091)
Parental Variables		
high school education	0.804[0]	0.076
	(0.173)	(0.101)
university degree	0.614[0]	0.232[1]
	(0.205)	(0.085)
Geographical Origin		
Nordic(not incl. Swedish)	-0.278	-0.279[0]
	(0.218)	(0.097)
Western Countries	-0.076	-0.095
	(0.276)	(0.123)
Eastern-Europe	-0.443	-0.451
	(0.295)	(0.133)
Middle-East	-2.675[0]	-1.551[0]
	(0.443)	(0.165)
Asia	-0.837	-0.523
	(0.471)	(0.227)
Africa	-2.838[0]	-1.663[0]
	(0.769)	(0.266)
Latin-America	-2.830[0]	-1.761[0]
	(0.541)	(0.200)

As before, the reference variables included in the constant are: female, one-parental family, no Swedish parent, secondary education, and Swedish .

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Table 5: (cont.) Estimated parameters for transitions from non-employment after continued education

n=657	To Work	
	n=486 Cox Proportional hazard gamma mixture	n=486 Log-Logistic hazard gamma mixture
Parental Age	-0.016	-0.012[7]
	(0.011)	(0.006)
Ethnic Concentration in Municip	0.052	0.009
	(0.134)	(0.045)
Economic Variables		
Parental Income (log)	0.566[0]	0.275[0]
	(0.201)	(0.097)
Father's labour income	0.018	0.034
	(0.042)	(0.032)
Mother's labour income	0.075	0.054
	(0.072)	(0.039)
Asset income	-0.003	-0.006
	(0.011)	(0.005)
Welfare income	-0.035	-0.046
	(0.067)	(0.029)
All other income	-0.004	0.032
	(0.010)	(0.059)
ln_gamma constant		1.199[0]
		(0.077)
ln_delta constant		0.212
		(0.193)
theta	0.747	
	(0.275)	

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